

REMARKS

The Office Action mailed February 6, 2006, has been received and reviewed. Claims 35 through 38, and 41 through 58 are currently pending in the application. Claims 35 through 37, and 41 through 46 are withdrawn. Claims 38 and 47 through 58 stand rejected. Applicant has amended claims 47, 51, and 55, has cancelled claims 48, 52, and 56, and respectfully requests reconsideration of the application as amended herein.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 5,663,608 to Jones et al. and further in view of U.S. Patent No. 5,909,635 to Marieb et al.

Claims 47, 48, 50 through 52, 54 through 56, and 58 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Jones et al. (U.S. Patent No. 5,663,608) in view of Marieb et al. (U.S. Patent No. 5,909,635). Applicant respectfully traverses this rejection, as hereinafter set forth.

Claims 47 and 51 are independent claims and are amended herein. In particular, claim 47 is amended to include the recitations of claim 48 and claim 51 is amended to include the recitations of claim 52. Each of amended claims 47 and 51 recite, in part, “a conductor...including a first part and a second part, the first part comprising chromium...the first part forming a sheath completely wrapped around an upper surface, a lower surface, a left edge, and a right edge of the second part.”

In order to establish a *prima facie* obviousness rejection under 35 U.S.C. § 103(a), a combination of references must teach or suggest all of the claim limitations. *See*, M.P.E.P. 706.02(j) (*citing, In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)). Neither Jones et al. nor Marieb et al. teach or suggest all of the recitations of amended claims 47 and 51. In particular, the cited references fail to teach a conductor sheath comprising chromium which is completely wrapped around a second part of a conductor as recited in the claims.

As admitted in the Action, Jones et al. “fails to disclose that the first part is forming a sheath completely wrapped around an upper surface, lower surface a left edge, and a right edge of the second part [sic].” *See, Action* at p. 3. Instead, Marieb et al. is relied upon for the teaching of

a sheath such as that recited in claims 47 and 51. The teachings of Marieb et al., however, fail to teach or suggest the formation of a sheath that comprises chromium. Although Jones et al. teaches conductors comprising chromium, neither reference teaches or suggests all of the recitations of claims 47 and 51, precluding a *prima facie* obviousness rejection.

In order for a combination of references to support a *prima facie* obviousness rejection, the combination of references must be motivated; there must be some suggestion or motivation, either in the references themselves or to one of skill in the art, to combine the references. *See, In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). No such motivation exists to combine Jones et al. with Marieb et al.

The Action alleges that “it would have been obvious to one having ordinary skill in the art at the time the invention was made to wrap the second part completely by the first part as taught by Marieb et al. since this will provide improved electromigration.” *See, Action* at p. 3. Marieb et al. teaches that “electromigration is a phenomenon that occurs in aluminum interconnects while the circuit is in operation” and that “encapsulation of the interconnect using TiAl_3 increases electromigration lifetime.” *See, Marieb et al.* at col. 1, lines 29-30; and col. 5, lines 1-4. Further, Marieb et al. acknowledges that “one solution to increasing the electromigration lifetime of an aluminum interconnect is to introduce an alloying species, for example, typically 0.5% copper to the aluminum.” *See, Marieb et al.* at col. 1, lines 46-49. Thus, Marieb et al. teaches that electromigration lifetime may be improved by adding an alloy, such as copper, to an aluminum interconnect or by wrapping an aluminum interconnect with TiAl_3 . Marieb et al. does not recognize or describe the motivation alleged by the Action, that any wrapping will improve electromigration; and Jones et al. does not acknowledge or recognize that the conductors of Jones et al. suffer from electromigration.

If one of skill in the art were to combine Jones et al. and Marieb et al. as suggested by the Action, the combination would result in the wrapping of an aluminum interconnect with a TiAl_3 wrapping layer, not a chromium layer because the only wrapping layer taught by the references is a TiAl_3 layer. Nowhere in Marieb et al. is it suggested that a chromium layer would improve electromigration lifetime of the structures of Jones et al. Furthermore, in those instances where Jones et al. employs an aluminum conductive layer, the aluminum conductive layer is an alloy of

aluminum and copper. As taught by Marieb et al., the inclusion of copper in an aluminum conductor as an alloy of aluminum and copper improves the electromigration lifetime of the conductor so a person of skill in the art would not be motivated to add a wrap layer of TiAl_3 , or any other layer, around Jones et al.'s aluminum-copper conductors.

The motivation proffered by the Action does not motivate a combination of Jones et al. with Marieb et al. for any reason, let alone to form a structure as recited in amended claims 47 and 51. The lack of such motivation precludes a *prima facie* obviousness rejection.

For at least the foregoing reasons, claims 47 and 51 are not obvious in light of the combination of Jones et al. and Marieb et al. Applicant respectfully requests the withdrawal of the 35 U.S.C. § 103(a) obviousness rejection of claims 47 and 51.

Claims 49 and 50 depend from claim 47. As dependent claims of a nonobvious independent claim, claims 49 and 50 are also nonobvious. *See*, M.P.E.P. § 2143.03 (citing, *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)(if an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious)).

Similarly, claims 53 and 54 are nonobvious because they depend from a nonobvious independent claim: claim 51. *Id.*

Claim 55 is an independent claim and is amended to include the recitations of claim 56, namely: “each conductor in the network comprising a first conductive material comprising chromium.” The combination of references fails to teach or suggest such recitations and no motivation exists to combine the references to make obvious claim 55.

Neither of the cited references teaches or suggests a “first conductive material comprising chromium” wherein “the first conductive material forming a sheath completely wrapped around at least a portion of the second conductive material” as recited in claim 55. The lack of such teaching precludes a *prima facie* obviousness rejection. *See, In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

In addition, no motivation exists to combine the cited references. The lack of motivation to combine Jones et al. and Marieb et al., and especially the lack of motivation to combine the references to utilize chromium as a material forming a sheath completely wrapped around at least a portion of a second conductive material, precludes a *prima facie* obviousness rejection of claim

55 under 35 U.S.C. § 103(a). *Id.*

Claims 57 and 58 depend from claim 55. As dependent claims of a nonobvious independent claim, claims 57 and 58 are also nonobvious. *See, In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

For at least the forgoing reasons, claims 47, 49 through 51, 53 through 55, and 57 and 58 are nonobvious. Applicant respectfully requests withdrawal of the 35 U.S.C. § 103(a) obviousness rejection of those claims.

35 U.S.C. § 103(a) Obviousness Rejection based on 35 U.S.C. § 102(e) Art

Claims 38, 47 through 49, 51 through 53, and 55 through 57 stand rejected under 35 U.S.C. § 103(a) as being anticipated by Raina et al. (U.S. Patent No. 6,657,376), in view of Marieb et al. (U.S. Patent No. 5,909,635). Raina et al. allegedly only constitutes prior art under 35 U.S.C. § 102(e). *See, Action* at p. 4. Applicant respectfully traverses this rejection, as hereinafter set forth.

The present application - U.S. Patent Application No. 10/671,332 - and U.S. Patent 6,657,376 to Raina et al., were, at the time the invention of the present application was made, owned by Micron Technology Inc. Furthermore, the inventor of the present application and the inventors of U.S. Patent 6,657,376 were at all times, including at the time that the invention of the present application was made, obligated to assign all rights in and to the inventions to Micron Technology Inc.

The common ownership of U.S. Patent 6,657,376 and the inventions of the present application, at the time the inventions of the present application were made, precludes an obviousness rejection based upon 35 U.S.C. § 103(a) because under 35 U.S.C. § 103(c), Raina et al., which the Action alleges is only prior art under 35 U.S.C. § 102(e), cannot preclude patentability if it was jointly owned with the present invention at the time the present invention was made. The joint ownership as indicated by statements *supra* preclude an obviousness rejection under 35 U.S.C. § 103(a) based upon 35 U.S.C. § 103(c).

Applicant respectfully requests the withdrawal of the 35 U.S.C. § 103(a) rejections of claims 38, 47 through 49, 51 through 53, and 55 through 57 based upon the disqualification of

Raina et al. as prior art by 35 U.S.C. § 103(c).

Applicants also respectfully request a notification of allowance of claims 38, 49, 53, and 57, because none of claims 38, 49, 53, and 57 are rejected on any other basis.

ENTRY OF AMENDMENTS

The amendments to claims 47, 51, and 55 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application. Further, the amendments do not raise new issues or require a further search.

CONCLUSION

Claims 38, 47, 49 through 51, 53 through 55, 57, and 58 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted,



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